

**REMARKS**

Claims 27-32, 34, and 35 are pending in the application. Claims 1-13, 25, 26 and 33 have been canceled. Claims 27, 32, and 34 have been amended. Support for the amendments to claims 27, 32, and 34 can be found in the specification such as on pages 6-7. Therefore, no new matter has been introduced.

**I. Claim Rejections - 35 U.S.C. § 112**

Claims 1-13 and 25-26 are rejected under 35 U.S.C. 112, first paragraph, as allegedly failing to comply with the written description requirement.

Without admitting that the rejection is correct, claims 1-13 and 25-26 have been canceled. In this regard, this rejection is moot.

**II. Claims Rejections - 35 U.S.C. § 103**

The Office Action includes three new grounds for rejection under 35 U.S.C. § 103, as follows:

claims 27, 29-30, and 32-35 have been rejected under 35 U.S.C. § 103 as allegedly being unpatentable over U.S. Published Application No. 2004/0173908 to Barth et al. ("Barth '908") in view of U.S. Published Application No. 2003/0067077 to Lee ("Lee '077");

claim 28 has been rejected under 35 U.S.C. § 103 as allegedly being unpatentable over Barth '908 in view of Lee '077, further in view of Applicant's admitted prior art; and

claim 31 has been rejected under 35 U.S.C. § 103 as allegedly being unpatentable over Barth '908 in view of Lee '077, further in view of U.S. Patent No. 6,313,517 to Lauterbach *et al.*

Claim 27 presently recites an adhesive film being constituted by a silicon-based compound having an aromatic ring.

Referring to page 5 of the Office Action, the Examiner concedes that Barth '908 is deficient in that it fails to teach an adhesive film being constituted by a silicon-based compound having an aromatic ring. For example, Barth '908 fails to disclose that a silicon-based compound, if any at all, would include an aromatic ring. Lee '077 is relied upon to make up for this deficiency. Lee '077 teaches an organic copper diffusion barrier layer 118 that at least comprises a benzocyclo polymer, such as benzocyclobutene. *See* paragraph [0019].

Lee '077 fails to alleviate the deficiencies of Barth '908. Lee '077 fails to teach that the organic copper diffusion barrier layer 118 contains a silicon-based compound having an aromatic ring. The benzocyclo polymer present in the organic copper diffusion barrier layer 118 includes no silicon. Lee '077 also fails to disclose how to introduce silicon into the benzocyclo polymer thereof. In this regard, Lee '077 fails to alleviate the deficiency in Barth '908 that it fails to teach an adhesive film being constituted by a silicon-based compound having an aromatic ring.

Further, a person of ordinary skill in the art would not have been motivated to replace the adhesion promoter layer 118 disclosed in Barth '908 with the organic copper diffusion barrier layer 118 disclosed in Lee '077. Figure 2 of Barth '908 shows an interconnect structure comprising in upwards order cap layer 117, adhesion promoter 118, and ILD 119. Barth '908 also teaches that cap layer 117 may be composed of silicon nitride. *See* paragraph [0037].

In contrast, Figure 11 of Lee '077 shows that organic diffusion barrier layer 118 is provided between a first dielectric layer 110 and a second dielectric barrier layer 120 or between

a first copper layer 116a and the second dielectric layer 120. Lee '077 also discloses that both organic dielectric layer 110 and second dielectric barrier layer 120 include a spin-on polymer, such as FLARE, SiLK, PAE-II, Velox, etc. *See*, paragraphs [0014] and [0021].

Such disclosures fail to suggest that organic diffusion barrier layer 118 disclosed in Lee '077 would have been effectively adhesive in the interconnect structure disclosed in Barth '908. A person of ordinary skill in the art would have immediately appreciated that the organic diffusion barrier layer 118 as disclosed in Lee '077 is used for the purpose of obtaining adhesion to first dielectric layer 110, a second dielectric barrier layer 120, and a first copper layer 116a as disclosed in Lee '077. On the contrary, a person of ordinary skill in the art would not have appreciated that organic diffusion barrier layer 118 would have been effectively adhesive with a low dielectric constant film including a silicon-containing organic compound. As described above, Lee '077 fails to teach that the first dielectric layer 110 and second dielectric barrier layer 120 include a silicon-containing organic compound. Barth '908 teaches that cap layer 117 may be composed on silicon nitride. In this regard, a person of ordinary skill in the art would not have been motivated to use the organic diffusion barrier layer 118, as disclosed in Lee '077, with the cap layer 117 as disclosed in Barth '908.

Additionally, each of claims 28-32, 34, and 35 depends from claim 27. In this regard, claims 28-32, 34, and 35 are nonobvious for at least the same reasons as claim 27.

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the

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Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.


Respectfully submitted,

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